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Two - phase thermosyphon filled with R410A refrigerant operating at low evaporator temperature (Article)

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Abstract

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The thermal performances of a R410A filled thermosyphon subjected to low heat flux from 1882 W/m2 to 4423 W/m2 and evaporator wall temperatures between 20 °C and 50 °C with fill ratios 1.00 and 0.75 and at different inclinations from 45°, 68° and 90° were investigated. The axial temperature distribution of the thermosyphon was found to be uniform for all temperatures difference of evaporator at all power inputs. The performance of the thermosyphon which is determined from the heat transfer capability of the thermosyphon was found to be dependent of inclination angle and fill ratio. Experimental results show that heat transfer coefficient increases as the heat input increase while thermal resistance decreases exponentially with increasing input power. Increase in fill ratio and inclination angle at various heat input contributed to a better thermosyphon performance, at where heat transfer was highest at fill ratio 1.00 and inclination angle of 68°. In addition experimental and application measured readings have a percentage error less than 10 %. © 2019 Penerbit Akademia Baru.

Author keywords

Dry-out limitation | Filling ratio | Heat transfer coefficient | Inclination angle two phase thermosyphon | Thermal resistance

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References (15)

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1 Faghri, A.
"Heat pipes: review, opportunities and challenges."
(2014) *Frontiers in Heat Pipes (FHP)*, 5 (1).

2 Nguyen-Chi, H., Groll, M.
Entrainment or flooding limit in a closed two-phase thermosyphon

(1981) *Journal of Heat Recovery Systems*, 1 (4), pp. 275-286. Cited 21 times.
doi: 10.1016/0198-7593(81)90038-2

View at Publisher

3 Park, Y.J., Kang, H.K., Kim, C.J.
Heat transfer characteristics of a two-phase closed thermosyphon to the fill charge ratio

(2002) *International Journal of Heat and Mass Transfer*, 45 (23), pp. 4655-4661. Cited 58 times.
doi: 10.1016/S0017-9310(02)00169-2

View at Publisher

4 Ong, K.S., Goh, G., Tshai, K.H., Chin, W.M.
Thermal resistance of a thermosyphon filled with R410A operating at low evaporator temperature

(2016) *Applied Thermal Engineering*, 106, pp. 1345-1351. Cited 11 times.
http://www.journals.elsevier.com/applied-thermal-engineering/
doi: 10.1016/j.applthermaleng.2016.06.080

View at Publisher

5 Alizadehdakhel, A., Rahimi, M., Alsairafi, A.A.
CFD modeling of flow and heat transfer in a thermosyphon

(2010) *International Communications in Heat and Mass Transfer*, 37 (3), pp. 312-318. Cited 131 times.
doi: 10.1016/j.icheatmasstransfer.2009.09.002

View at Publisher

6 Akash
"Two phase thermosyphon-A review of studies."
(2016) *International journal of engineering science & research technology*, 5 (1), pp. 193-205.

7 Anjankar, P.G., Yarasu, R.B.
"Experimental analysis of condenser length effect on the performance of thermosyphon."
(2012) *International Journal of Emerging Technology and Advanced Engineering*, 2 (3), pp. 494-499. Cited 6 times.

8 Jafari, D., Filippeschi, S., Franco, A., Di Marco, P.
Unsteady experimental and numerical analysis of a two-phase closed thermosyphon at different filling ratios

(2017) *Experimental Thermal and Fluid Science*, 81, pp. 164-174. Cited 19 times.
doi: 10.1016/j.expthermflusci.2016.10.022

View at Publisher